

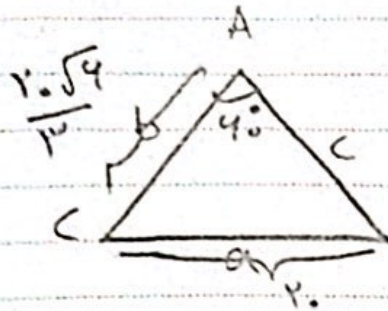
٢٥

خرداد ۱۳۹۹
۱۹ رمضان ۱۴۳۹

حل المسألة، دوازدهم جمادى

$$B + C = 120^\circ \Rightarrow A = 60^\circ$$

①

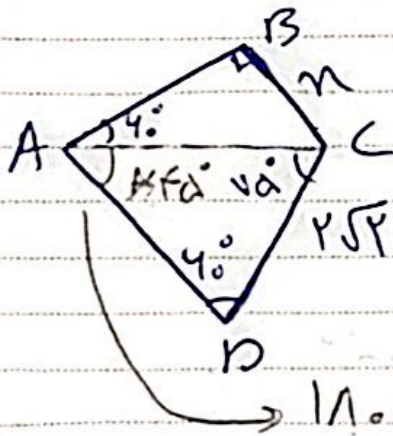


$$\frac{b}{\sin B} = \frac{a}{\sin A} = \frac{c}{\sin C}$$

$$\Rightarrow \frac{10}{\sin 60^\circ} = \frac{10\sqrt{4}/3}{\sin B} \Rightarrow \sin B = \frac{\sqrt{3}}{2} \Rightarrow B = 60^\circ$$

$B + C = 120^\circ \Rightarrow C = 60^\circ$ ✓

②



$$\frac{10}{\sin 60^\circ} = \frac{10\sqrt{3}}{\sin C} \Rightarrow \sin C = \frac{\sqrt{3}}{2} \Rightarrow C = 60^\circ$$

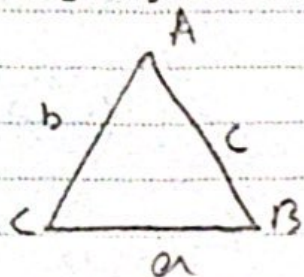
③

$$120^\circ - (60^\circ + 60^\circ) = 0^\circ$$

④

$$\Rightarrow \frac{10\sqrt{3}}{\sin 60^\circ} = \frac{10}{\sin 60^\circ} \Rightarrow \boxed{n = 10} \checkmark \checkmark$$

٢٠ رمضان ١٤٣٩



$$\left\{ \begin{array}{l} (b^2 - 1) \frac{\sin \hat{C}}{\sin \hat{B}} = c \\ \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \end{array} \right.$$

(٣)

$$\Rightarrow b \frac{\sin C}{\sin B} = c \Rightarrow b^2 - 1 = b \Rightarrow \frac{1}{a} b^2 - \frac{1}{b} - \frac{1}{c} = 0$$

$$\xrightarrow{a+c=b} b=1 \text{ قو } \quad , \quad b = \frac{c}{a} = 1 \text{ قو } \checkmark$$

$$a^2 = b^2 + c^2 - 2bc \cos A \text{ بقانون جيبس}$$

(٤)

$$149 = 441 + 400 - 140 (\cos \hat{B}) \rightarrow \cos \hat{B} = \frac{400}{140} = \frac{10}{7} \checkmark$$

$$\Rightarrow \cos \hat{B} + \sin \hat{B} = 1 \Rightarrow \frac{10}{7a} + \sin \hat{B} = 1 \rightarrow \sin \hat{B} = \frac{a}{7a}$$

$$\Rightarrow \sin \hat{B} = \frac{1}{7} \checkmark$$

(٥)

$$a^2 = 14 + 4(1 + 3 + 2\sqrt{3}) - (14(1 + \sqrt{3}) \frac{1}{7})$$

(الف)

$$\Rightarrow a^2 = 14 + 4 + 12 + 8\sqrt{3} - 1 - 2\sqrt{3} = 24 \Rightarrow a = 2\sqrt{6} \checkmark \text{ جواب}$$

(٦)

$$\frac{b}{\sin B} = \frac{c}{\sin C} = \frac{a}{\sin A} \Rightarrow \frac{2\sqrt{4}}{\frac{\sqrt{3}}{2}} = \frac{f}{\sin B} \quad (ب)$$

$$\Rightarrow \sin B = \frac{\sqrt{3}}{2} \rightarrow B = 60^\circ \Rightarrow A + B + C = 180^\circ \Rightarrow C = 60^\circ$$

$$(٤) \quad a^2 = b^2 + c^2 - 2bc \cos A \Rightarrow \text{طبق قضيه فيثاغورس}$$

$$\rightarrow f = f + 1 - f \cos 60^\circ \Rightarrow \cos 60^\circ = \frac{1}{2} \quad \text{باتوجه به شکل سوال}$$

$$DE^2 = 34 + 14 - f \cos 60^\circ \Rightarrow DE = 2\sqrt{10} \quad \checkmark$$

$$a^2 = b^2 + c^2 - 2bc \cos A \quad (٧) \quad (الف)$$

$$\rightarrow (BC)^2 = 2^2 + 4^2 - 10 \cos \frac{1}{2} \Rightarrow (BC)^2 = 14 \Rightarrow BC = \sqrt{14} \quad \checkmark$$

$$S = \frac{1}{2} bc \sin A \rightarrow \frac{1}{2} \times 10 \times \frac{\sqrt{3}}{2} = 10\sqrt{3} \quad \checkmark \quad (ب)$$

①

$$\frac{(b+c)^2 - a^2}{bc(\cos \hat{A} + 1)} = \frac{b^2 + 2bc + c^2 - a^2}{bc(\cos \hat{A} + 1)}$$

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$$\Rightarrow \frac{2bc + 2bc \cos \hat{A}}{bc(\cos \hat{A} + 1)} = \frac{2bc(\cos \hat{A} + 1)}{bc(\cos \hat{A} + 1)} \quad \checkmark \quad \text{۳}$$

②

$$\frac{a^3 + b^3 - c^3}{a+b-c} = a^2 \Rightarrow a^3 + b^3 - c^3 = a^2(a+b-c)$$

۲

$$\Rightarrow b^3 - c^3 = a^2b - a^2c \Rightarrow (b-c)(b^2 + bc + c^2) = a^2(b-c)$$

$$\Rightarrow b^2 + bc + c^2 = a^2 \Rightarrow b^2 + c^2 - 2bc \cos \hat{A} = a^2$$

$$\Rightarrow -2 \cos \hat{A} = 1 \Rightarrow \boxed{\cos \hat{A} = -\frac{1}{2}} \checkmark \rightarrow \hat{A} = 120^\circ$$

③

$$\frac{1}{r} a(1 + 2 \cos \theta)(1 - \cos \theta) \times \frac{1}{r} = 2$$

$$\Rightarrow -2 \cos \theta + 1 \cos \theta - 2 = 0 \Rightarrow \text{① } \cos \theta = 1$$

$$\text{② } \cos \theta = \frac{5}{4} \cos \theta$$

۲

لذا $-1 \leq \cos \theta \leq 1$

$$a^2 = b^2 + c^2 - 2bc \cos \hat{A}$$

$$a^2 = 14 + 9 - 1\sqrt{3}$$

$$\boxed{a^2 = 20 - 1\sqrt{3}} \checkmark$$

هدف خود را باید روی واقعیت ها بنا سازیم